FlamMap

FlamMap is a fire behavior mapping and analysis program that computes potential fire behavior characteristics (spread rate, flame length, fireline intensity, etc

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The FlamMap fire mapping and analysis system (Finney 2006; Stratton 2006) is a PC-based program that describes potential fire behavior for constant environmental conditions (weather and fuel moisture). Fire behavior is calculated for each pixel within the landscape file independently, so FlamMap does not calculate fire spread across a landscape. Potential fire behavior calculations include surface fire spread (Rothermel 1972), crown fire initiation (Van Wagner 1977), and crown fire spread (Rothermel 1991). Dead fuel moisture is calculated using the Nelson model (Nelson 2000) and FlamMap permits conditioning of dead fuels in each pixel based on slope, shading, elevation, aspect, and weather.

Because environmental conditions remain constant, FlamMap will not simulate temporal variations in fire behavior caused by weather and diurnal fluctuations as *FARSITE* does. Nor will it display spatial variations caused by backing or flanking fire behavior. These limitations need to be considered when viewing FlamMap output in an absolute rather than relative sense. However, outputs are well-suited for landscape level comparisons of fuel treatment effectiveness because fuel is the only variable that changes. Outputs and comparisons can be used to identify combinations of hazardous fuel and topography, aiding in prioritizing fuel treatments.

The FlamMap software creates raster maps of potential fire behavior characteristics (for example, spread rate, flame length, crown fire activity) and environmental conditions (dead fuel moistures, mid-flame wind speeds, and solar irradiance) over an entire *FARSITE* landscape. These raster maps can be viewed in FlamMap or exported for use in a GIS, image, or word processor.

FlamMap is not a replacement for *FARSITE* or a complete fire growth simulation model. There is no temporal component in FlamMap. It uses spatial information on topography and fuels to calculate fire behavior characteristics for a single set of environmental conditions.

FlamMap is widely used by the U.S. Forest Service, National Park Service, and other federal and state land management agencies in support of fire management activities. It is designed for use by users familiar with fuels, weather, topography, wildfire situations and the associated terminology. Because of its complexity, only users with the proper fire behavior training and experience should use FlamMap where the outputs are to be used for making fire and land management decisions.

It uses the same spatial and tabular data and incorporates the same fire behavior models as *FARSITE*.

Where FlamMap Fits In:

FlamMap is part of a suite of fire behavior systems that includes BehavePlus, *FARSITE*, and FSPro. These are complementary systems that are based on essentially the same fire models. BehavePlus is a point system with input supplied interactively by the user. FlamMap, *FARSITE*, and FSPro are spatial systems that use the same base GIS data. Following are some points of comparison:

Technical Support:

The first level of technical support is provided through your local support channels. The second level of technical support is available from the Fire Applications Help Desk.

The second level of technical support is provided by the USDA Forest Service Fire and Aviation Interagency Incident Applications (IIA) HelpDesk.

Phone: (866) 224-7677 or (616) 323-1667,
Fax: (616) 323-1665
E-mail: IIA-Helpdesk@fs.fed.us
Website: https://iia-hd.peckham-enclave.us/

The IIA HelpDesk is available for help with software issues only and cannot answer fire behavior questions.

Image 1: Using FlamMap is different from most Windows® applications. In addition to utilizing menus, commands, and toolbar buttons, FlamMap uses an expanding tree structure and context menus in the left hand pane of the project window to guide you through your work. The right hand pane of the Project window displays the active theme selected in the left hand pane. This display can be zoomed, colors changed, legends displayed, etc.

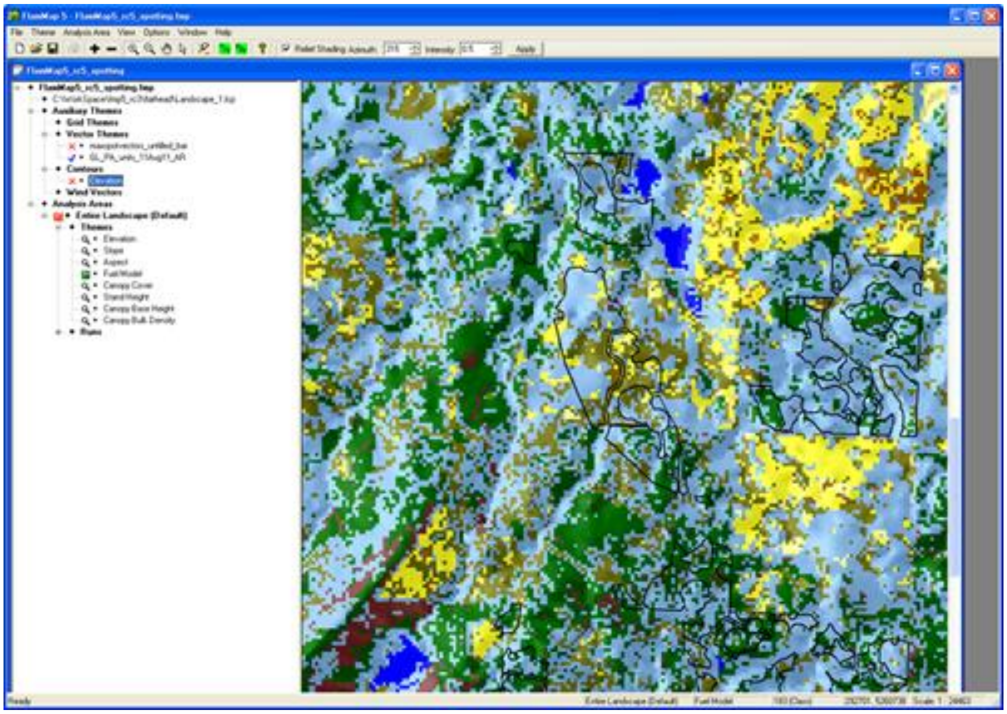


Image 2: Burn Probabilities and Minimum Travel Time (MTT) Perimeters FlamMap can use either random ignitions or a user supplied ignition file to determine burn probabilities across a given landscape under a constant set of fuels, wind and weather conditions. The following example displays the simulation results for 100 random ignitions across a landscape along with their respective burn probabilities.

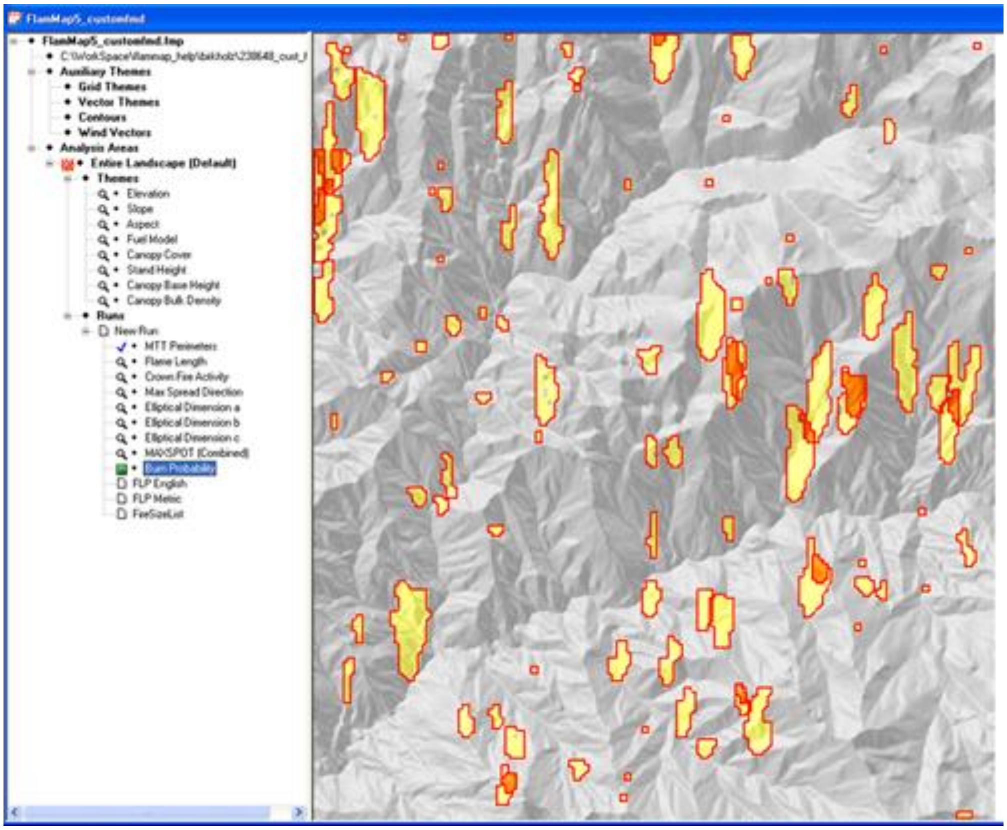


Image 3: Barrier Files- FlamMap can incorporate barriers into MTT analyses. Barriers can either be filled or unfilled. The following two examples display the effects of using these two barrier types. Notice the effect of spotting in both of these examples. In both examples the MTT Arrival Time (red to yellow shading) and MTT Flow paths (black lines) are displayed. Filled Barrier - Notice how the fire burns up to the edge of the filled barrier (red polygon) and then spots across it. The fire also flanks around the filled barrier to the west and then continues spreading to the northwest.

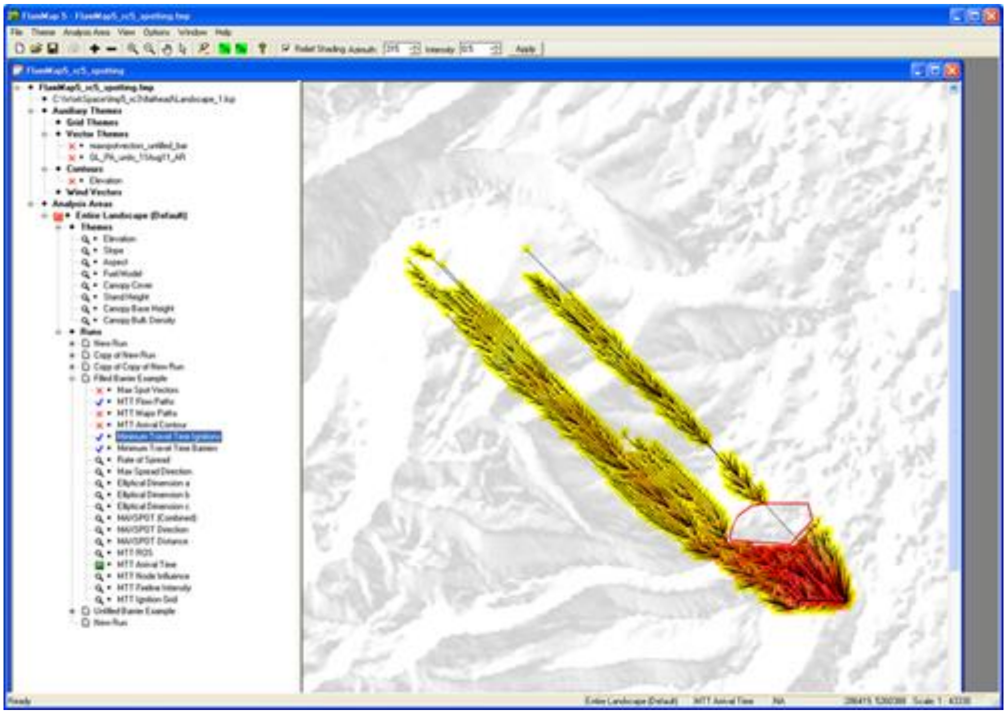
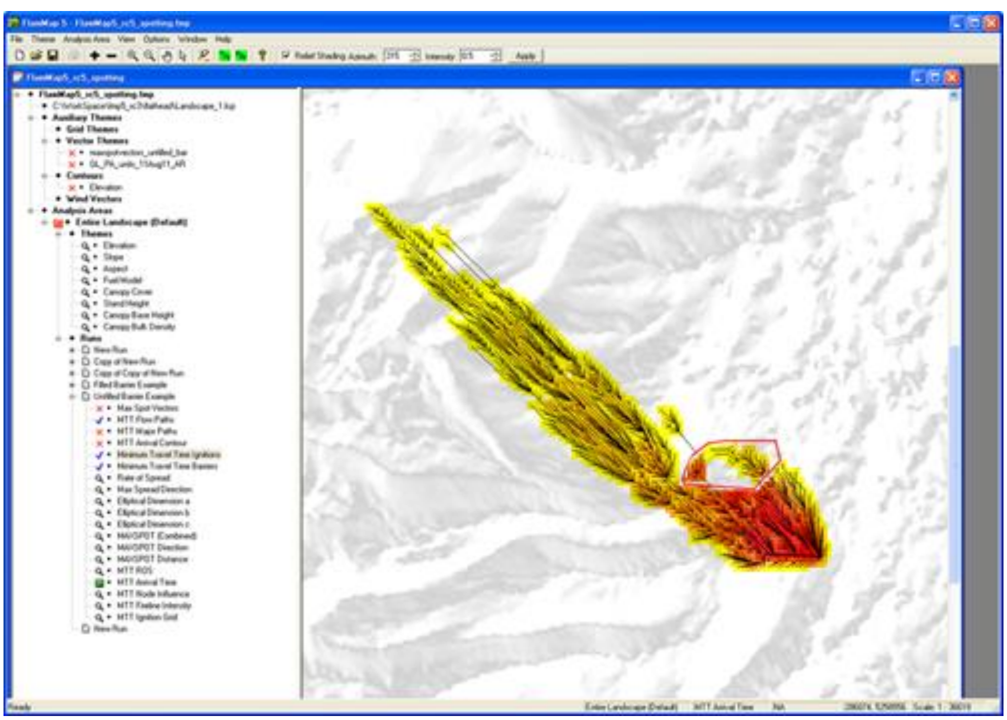


Image 4: Unfilled Barrier - Notice how the fire burns up to the edge of the unfilled barrier (red polygon). When a barrier is unfilled the interior can burn yet the perimeter of the unfilled barrier is still resistant to surface fire spread. In this example the fire spreads up to the edge of the barrier and then spots into it in two locations and then spots outside of the unfilled barrier file. The fire also flanks around the filled barrier to the west and then continues spreading to the northwest.



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Select Publications & Products

FlamMap Background Material

Finney, M. A. 2006. An overview of FlamMap fire modeling capabilities. In: Fuels management—how to measure success: conference proceedings. 2006 March 28-30; Portland, Oregon. Proceedings RMRS-P-41. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 213-220. (647 KB; 13 pages)

Finney, M.A. 2002. Fire growth using minimum travel time methods. Can. J. For. Res. 32(8):1420-1424.

Finney, M. A. 2004. *FARSITE*: Fire Area Simulator–model development and evaluation. Research Paper RMRS-RP-4 Revised. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. (1,667 KB; 47 pages)

Guides for Spatial Fire Behavior Analysis

Stratton, R. D. 2009. Guidebook on LANDFIRE fuels data acquisition, critique, modification, maintenance, and model calibration. General Technical Report RMRS-GTR-220. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. (7,715 KB; 54 pages)

Stratton, R. D. 2006. Guidance on spatial wildland fire analysis: models, tools, and techniques. General Technical Report RMRS-GTR-183. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. (1,558 KB; 15 pages)

Fuel Treatment Location Simulations using FlamMap

Finney, M.A. 2007. A computational method for optimizing fuel treatment locations. Intl. J. Wildl. Fire. 16:702-711.

Finney, M.A., R.C. Seli, C.W. McHugh, A.A. Ager, B.Bahro, and J.K. Agee. 2007. Simulation of long-term landscape-level fuel treatment effects on large wildfires. Intl. J. Wildl. Fire. 16:712-727.

Ager, A. A.; Finney, M. A.; Kems, B. K.; Maffei, H. 2007. Modeling wildfire risk to northern spotted owl (Strix occidentalis caurina) habitat in Central Oregon, USA. Forest Ecology and Management 246: 45-56. (2,040 KB; 12 pages)

Stratton, R. D. 2004. Assessing the Effectiveness of Landscape Fuel Treatments on Fire Growth and Behavior. Journal of Forestry. Pp 32-40 October/November 2004

Finney, M. A. 2004. Landscape fire simulation and fuel treatment optimization. In: Hayes, J. L.; Ager, A. A.; Barbour, J. R., tech. ed. Methods for integrating modeling of landscape change: Interior Northwest Landscape Analysis System. General Technical Report PNW-GTR-610. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Station: 117-131. (647 KB; 15 pages)

Finney, M.A. 2004. Chapter 9, Landscape fire simulation and fuel treatment optimization. IN: J.L. Hayes, A.A. Ager, J.R. Barbour (tech. eds). Methods for integrated modeling of landscape change: Interior Northwest Landscape Analysis System. PNW-GTR-610. p 117-131.

Finney, M.A. 2001. Design of regular landscape level fuel treatment patterns for modifying fire growth and behavior. For. Sci. 47(2):219-228.